Application for a superficies license to encumber a public water body with an offshore wind farm in the Saare 1 area

Update

Tallinn, 21 October 2024

Oxan Energy
7 rue Eugène Millon
75015 Paris
France

Date: 21.10.2024

Consumer Protection and Technical Regulatory Authority
Endla 10a, Tallinn 10142
info@ttja.ee

Application for a superficies license to encumber a public water body with an offshore wind farm in the Saare 1 area

This application responds to the notice of the intention to initiate the superficies licence procedure for the construction of an offshore wind farm in the Saare 1 area of CI Estonia Wind GmbH & Co. KG dated April 22, 2024, announced by the Consumer Protection and Technical Regulatory Authority (TTJA) on their web page (address: https://ttja.ee/).

Oxan Energy (hereinafter: **Oxan**, **Applicant or the Company),** hereby submits to TTJA a competitive application (hereinafter: **Application**) for a superficies license in accordance with § 113^3 of the Building Code and in line with the requirements of subsection (2) of § 113^9 of the Building Code, for encumbering a public water body with an offshore wind farm and associated facilities described further in this Application to be built in the Saare 1 area, covering ca 88 km^2, defined in the Estonian maritime spatial plan[1] (hereinafter: **MSP**) west of the coast of Saaremaa.

This Application is compliant with existing legal framework and offers an in-depth explanation regarding fulfilment of criteria presented in § 113^9 (2) of the Building Code. The Applicant plans to be the operator of the project during its development, construction and operation phases.

The Applicant is looking forward to positive decision regarding this Application. If required, the Company will be happy to provide further information related to the Applicant, the proposed solution or other elements of this Application.

Yours faithfully,

Nicolas Paul-Dauphin

President of the Management Board

[1] Available on the planning portal: http://mereala.hendrikson.ee/dokumendid/Planeeringulahendus/Kehtestamisele/1_MSP_Seletuskiri.pdf (last viewed 13.02.2023)

Table of Contents

Definitions and acronyms

The following definitions and acronyms have been used throughout this document.

Item	Explanation / Description
AIS	Automatic Identification System
AI	Artificial intelligence
Capex	Capital expenditure - Expenditure related to the construction phase of the Project
CfD	Contract for Difference
COD	Commercial Operation Date
CTV	Crew Transfer Vessel
Devex	Development Expenditure - expenditure related to the development stage of the Project to obtain a construction permit
DSCR	The debt-service coverage ratio is a measure of the cash flow available to pay current debt obligations
EBIDTA	Earnings before interest, taxes, depreciation and amortization
EIA	Environmental Impact Assessment
EEZ	Exclusive Economic Zone
EPCI	Engineering, Procurement, Construction and Installation
ESG	Environmental, Social, Governance
EYA	Energy Yield Assessment
FEED	Front End Engineering Design
FID	Final Investment Decision
FIDIC	Fédération Internationale Des Ingénieurs-Conseils, which means the international federation of consulting engineers
Ft	Foot, 1 ft = 0,3048 m
FTE	Full time equivalent
GDP	Gross Domestic Product
GIS	Geographic information system
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HSE	Health Safety Environment
IRR	Internal Rate of Return
LC	Local content
LCOE	Levelized Cost of Energy
LCOH	Levelized Cost of Hydrogen
LH2	Liquid hydrogen
MSP	Maritime Spatial Plan

Item	Explanation / Description
OEM	Original Equipment Manufacturer
Opex	Operating Expenditure - Expenditure related to the operation stage of the Project until decommissioning begins
OSS	Offshore Substation
P2G	Power to Gas
P2G2P	Power to Gas to Power
R&D	Research and Development
Repowering	The process of replacing older power plants with new ones
ROV	Remotely Operated Vehicle
SEA	Strategic Environmental Assessment
SES	Surface Effect Ship
SPV	Special Purpose Vehicle
SOV	Service Operating Vessel
T&I	Transport and Installation
TRL	Technology Readiness Level
TTJA	Consumer Protection and Technical Regulatory Authority
UN	United Nations
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator

1. Legal basis and method of submitting the Application

This application responds to the notice of the intention to initiate the superficies licence procedure for the construction of an offshore wind farm in the Saare 1 area CI Estonia Wind GmbH & Co. KG dated April 22, 2024 announced by the Consumer Protection and Technical Regulatory Authority (TTJA) on their web page (address: Riigimaale hoonestusõiguse seadmise teated | Tarbijakaitse ja Tehnilise Järelevalve Amet (ttja.ee)).

According to § 113[1] (1) of the Building Code (hereinafter: EhS), a superficies license is a fixed-term right to encumber the area of a public water body with a construction work permanently connected to its bottom which is not permanently connected to the shore. As the offshore wind farm is not permanently connected to the shore, a superficies license must be applied for in order to plan the encumbering of a public water body with a wind power plant. In accordance with EhS 113[3] (1) the application for a superficies license is submitted to the competent authority, which is the Consumer Protection and Technical Regulatory Authority (hereinafter: **TTJA**). This Application is submitted to TTJA via e-mail: info@ttja.ee.

The structure of this Application reflects in full the scope of the application presented in subsection 113[3] (2) and 113[9] (2) of the Building Code and "Instructions: Assessment of competing applications for a superficies licence" issued by TTJA in December 2023 (version 3).

This Application is based on the information known at the time of its submission, and the exact equipment, their dimensions, the mode of connection of the wind farm, etc. will be determined in the course of project development and will reflect the results of environmental and other studies and the EIA as well as the technology developed and available at the project design stage.

2. About the Applicant

2.1. General and statutory information

This Application is submitted by Oxan Energy, a company registered in France, organization number: 952 617 298 at 7 rue Eugène Millon 75015 Paris, with the statutory purpose of development, construction and operation of offshore wind projects and green hydrogen production units, including being as a service provider for third parties.

The contact details for this Application from the Applicant side is:

Name: Nicolas Paul-Dauphin

e-mail: Nicolas.paul-dauphin@oxan.energy

The Applicant confirms that the information filed with the Commercial Register, as well as those concerning the company's shareholders and its beneficial owners, is complete and accurate.

Commercial Register (language) has been appended to this Application as **Annex 1**.

The Entity's entries in the Register of Beneficial Owners (language) has been appended to this Application as **Annex 2**.

2.2. Business activity, capabilities and economic strength of the Applicant

Oxan Energy is a developer of renewable energy projects specialized in marine energies and particularly in floating offshore wind. Created in 2023 and based in France, the company is active internationally, mainly on European markets. With its team of recognised experts, Oxan Energy relies on more than 12 years of experience in floating offshore wind and thus gathers all the relevant skills and competences for the development of its projects. Oxan Energy is genuinely engaged in the energy transition, committed to figuring out solutions for a viable future for energy using offshore natural resources.

WHO WE ARE

OXAN ENERGY IS THE FLOATING OFFSHORE WIND PARTNER

- An offshore wind developer created in June 2023 by floating wind pioneers
- A business model: Equity partner in offshore wind projects/tenders with the intention to become an Independent Power Producer (IPP)
- Strong floating wind technical and bid management expertise
- Funded by a solid investor SWEN Capital Partners

OUR MISSION

IS TO BRING TOGETHER EXPERTISE AND MULTIPLYING ENERGIES TO DEVELOP PROJECTS TO MEET THE CHALLENGE OF ENERGY TRANSITION.

Please see more on Applicants' business activity, capabilities, ownership structure and economic strength in **Annex 3** to this Application.

2.3. Company ESG approach

2.3.1. Philosophy and values

Development of an effective ESG strategy requires a methodical and considered approach. Oxan Energy started by identifying and prioritizing their ESG challenges, establishing a dialogue with stakeholders to define company's ESG objectives, then choosing and collecting key ESG indicators and starting to develop required policies.

Oxan Energy begun the diagnostic phase based on ISO 26000 standards. In a second phase, the company will enrich their approach by using the Corporate Social Responsibility Directive (CSRD) method.

Diagnostic scope: to date, Oxan Energy have positioned themselves as a FOW developer. For certain items, the company assumes the role of making projections based on their knowledge and experience of past projects, in order to define more relevant objectives.

Providing a sustainability report will be a next medium-term project, aiming at demonstrating company's holistic approach, reinforcing company's transparency and legitimacy in terms of social responsibility, and meeting the growing expectations of the stakeholders.

Oxan Energy philosophy and values are presented in Figure 1 below.

Figure 1 – Oxan Energy philosophy and values

OUR PHILOSOPHY

MOVING RENEWABLE ENERGIES FORWARD, TOGETHER

A commitment to quality

Technically reliable, robust and ethically irreproachable projects. A unique approach that respects the environment and marine users. The ability to work in close collaboration with all stakeholders to optimize and adapt projects to their environment.

A reliable, long-term partner

Present from the development phase through to construction and operation. A solid partnership culture, based on the experience of past collaborations with a wide range of players. Backed by a reliable and committed financial partner.

A local and global player

A company based in France with an internationally experienced team recognized by its many successes.

Active mainly in European markets, with a strong local presence.

OUR VALUES

01. INTEGRITY

We create projects that are technically reliable, robust and ethically irreproachable.

02. COMMITMENT

We give ourselves the means to move society forward, through our ability to listen and understand the various issues at stake.

03. AGILITY

Oxan Energy is a human-sized company, with the ability to react quickly. An essential value that makes the difference in the industry.

04. BOLDNESS

Made up of men and women who entered the industry when few dared to believe in it, we know how to build on and leverage what we have already achieved, so that we can keep looking ahead to the future of renewable energy.

Source: Applicant

2.3.2. ESG strategy and actions

Actions to be taken as part of Oxans Energy ESG strategy are as follows:

Environmental protection

a. Mitigation and adaptation to <u>climate change</u>: Support a precautionary approach by communicating potential risks to our stakeholders and providing them with comprehensive risk information:

   i. A code of conduct or practice for our operations is currently being drawn up, which will confirm and frame our commitment to respecting the environment and contributing to sustainable development;

   ii. Company policy/agreements on well-being, Quality of life at work, remote working agreement, to raise employee awareness of ecological behaviors and actions;

   iii. Make an assessment of greenhouse gas emissions, by carrying out a carbon footprint assessment'

Social & Society responsibilities

a. Employees: Oxan Energy's most valuable resource is its team members wellbeing:

   i. Setting up a training program to promote skills enhancement & continuous learning
   ii. Awareness-raising sessions on occupational health and safety issues

b. Local commitment and concertation: Develop and operate projects that involve local communities, thereby helping to reduce the risks and costs of offshore wind energy and lowering electricity prices in countries that open up their territories to projects development.
   i. Develop innovative technological solutions for:
      - The various components of a wind farm (turbines, foundations, cables, etc.) and,
      - Combine with storage solutions (hydrogen), to overcome the variability of renewable energies or facilitate their integration into electricity grids.

Governance challenges

a. Business relationships: Sustainable Procurement through our supply chain according to clearly defined principles in order to prevent breaches of fundamental rights:
   i. Code of Conduct in progress, to work against corruption in all its forms;
   ii. Internal protection system for warning and the protection for whistleblowers.

3. Annex 3 – Confidential informationProject concept and main technical characteristics

3.1. Project concept

This Application relates to a project, to be established in the Saare 1 area (**Figure 2** below), covering ca 88 km^2, defined in the MSP as an area suitable for wind energy development, with total capacity of up to **900 MW** and up to **60 offshore wind turbines**, connected to the grid, generating green electricity, and/or potentially producing alternative fuels offshore (at the turbine or on separate platforms), together with associated infrastructure.

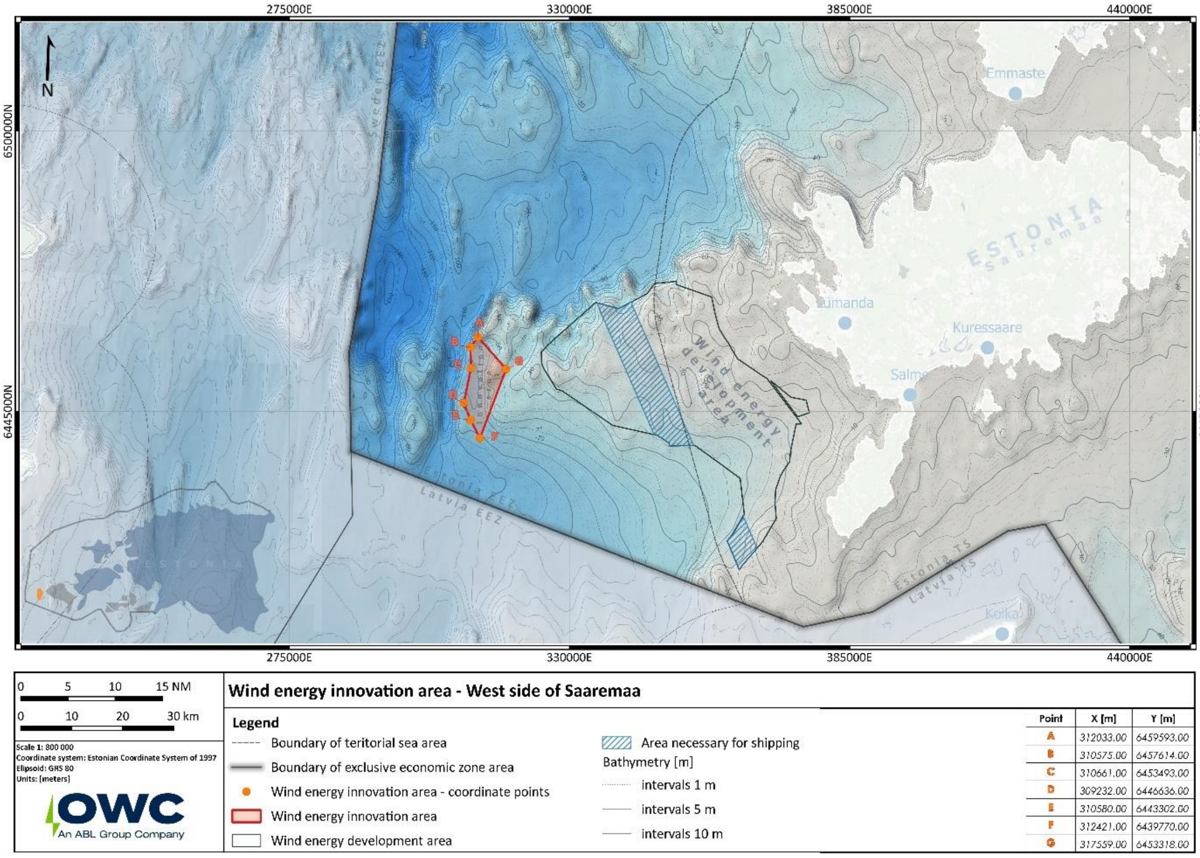
From the concept perspective the main objective of the Project is to develop an innovative offshore wind farm project and potentially deploy a number of other cutting-edge solutions in the Wind Energy Innovation Area.

From the commercial perspective, the main objectives of the Project are to:

a. Develop a cost-efficient floating wind solution for the Baltic Sea conditions, producing green electricity and / or hydrogen or other alternative fuels, with a Levelized Cost of Energy ("LCOE") compatible with the generation and delivery of commercially viable energy in the region;
b. Form a foundation to drive investment towards and ultimately create a reliable local supply chain capability at commercial scale, further supporting self-sufficiency regarding Estonian energy needs.

The Project will also be executed bearing in mind an efficient use of space with aquaculture or other solution deployment, all while ensuring occupational safety and environmental protection in accordance with the highest standards.

Figure 2 – Location of the Saare 1 area



Point	X [m]	Y [m]
A	312033.00	6459593.00
B	310575.00	6457614.00
C	310661.00	6453493.00
D	309232.00	6446636.00
E	310580.00	6443302.00
F	312421.00	6439770.00
G	317559.00	6453318.00

Source: Applicant on the basis of publicly available information

From technical perspective, key elements of the Project are:

1. **Base case – A full scale offshore floating wind farm** (with fixed bottom option to ensure effective use of space), which will be connected to the grid, and will consist of:
   a. **A maximum of 60 offshore wind turbines with total capacity of up to 900 MW**, which depending on the final selected technology and Project configuration, may be equipped with hydrogen production, storage and transfer facilities;
   b. **A maximum of 3 offshore substations** (HVAC or HVDC depending on the finally selected solution of power export options), those main function will be to collect the electricity produced at the turbines, increase the voltage and enable power transfer to land, or to transfer electricity to (a) hydrogen station(s) for hydrogen production or transfer power directly for export. In addition, it is assumed that offshore substations can be equipped with research and measurement equipment that support R&D efforts in Estonia;
   c. **Internal power grid** (inter array cables), consisting of dynamic and static cables, connecting individual wind turbines to adjacent ones or with offshore substation(s);
   d. **A maximum of 3 power evacuation cables** going from the offshore substation(s) to a suitable connection point;
2. **An optional offshore hydrogen production with:**
   a. **Up to 3 offshore platforms for hydrogen / alternative fuel production** with capacity resulting from further investigations;
   b. An internal hydrogen / alternative fuel network;

c. Hydrogen / alternative fuel transport pipeline going from optional offshore platform(s) for hydrogen / alternative fuel production to a collector;

3. **An optional pilot aquaculture project,** consisting of:

   a. A maximum of 6 optional floating offshore seaweed structures (pilot).

   In addition, fish-farming may be investigated for deployment within the Project area.

In summary, at this stage the Applicant takes into account a number of **Project scenarios**, which include supplying electricity to the grid, producing hydrogen or other alternative fuels offshore or a combination of the two, with a possibility to include other beneficial uses of the sea space.

Considering a rapid technological advancement as well as the objective to reduce cost and environmental impact, the decision as to the final configuration of the Project and the selection of technologies used will be based, amongst others, on:

a. The selected route to market approach and Project / product market competitiveness, which at the moment remains an open issue, subject to further investigation, utilizing the Applicant's specific expertise;
b. The results of environmental surveys, which will be performed in the course of EIA, seabed geophysical and geotechnical investigations, metocean study, etc.;
c. Technologies available at the time of FEED of the Project;
d. Availability and readiness of the Estonian supply chain;
e. Overall system production and cost optimization, including wake effect and yield assessment as well as balancing of turbine output with the power export system and alternative fuel production opportunities.

The implementation of the Project will also take into account, among others, European and international standards and the requirements of local regulations regarding design, construction as well as safety and environmental protection.

A key Project element will also be its cost and scope-optimized development and construction schedule, which currently indicates that the first power from the Project could be produced around 2035.

The Project corresponds to development plans, foremost the MSP, main legal acts and supports the implementation of strategic documents and policies which aim to increase green energy production and energy market security of Estonia.

Both the Base case and the Option will bring the latest technologies to Estonia, being the result of the latest research and innovative achievements. All possible impacts on the environment will be assessed duly in the EIA which will follow the conditions set in the MSP.

The intended uses of the presented construction works according to the Regulation no 51[2] are presented in

[2] Majandus- ja Taristuministri 02.06.2015 määrus nr 51. Ehitise kasutamise otstarvete loetelu.

Table 1 below.

Table 1 – Planned construction works codes in line with Regulation 51

Construction work	Code provided in the Regulation no 51
Wind farm facility	23023
substations (110 kV and higher voltage transformer substation)	22145
66-275[3] kV offshore substation or distribution facility	-
Other energy industry facility (hydrogen)	23029
Other local electricity distribution or transmission facility	22249
Submarine electricity cable	22244
Seaweed cultivation structure (aquaculture facilities)	24232

Source: Applicant on the basis of publicly available information

The number and further description of these construction works are set out in **Chapters 3.5** and **3.6** and of this Application.

3.2. Coordinates of the area to be encumbered in the public water body and the area's size in square meters

This Application is submitted for area Saare 1, those coordinates have been presented in **Table 2** below and are the same as in the application of CI Estonia Wind GmbH & Co. KG dated April 22, 2024, which formed a basis for the notice published by TTJA. The Saare 1 area covers an area of ca. 88 km^2 and is an integral part of wind energy development areas presented in the MSP. Coordinates of the Saare 1 area are presented in presented in **Table 2** below.

Table 2 – Coordinates of the Saare 1 area for which this Application is being submitted.

Point	Length East	North Latitude
A	312033.00	6459593.00
B	310575.00	6457614.00
C	310661.00	6453493.00
D	309232.00	6446636.00
E	310580.00	6443302.00
F	312421.00	6439770.00
G	317559.00	6453318.00

Source: Applicant on the basis of publicly available information

[3] The actual voltage level of the inter array network and power evacuation cables will depend on selected technical solutions at the time of wind farm design. The 66-220 kV offshore substation is mentioned on the basis of currently prevailing solutions, which in the future may call for e.g. 66-275 kV or 132 – 275 kV or 132 kV - 420 kV substation.

3.3. Suitability of wind energy innovation area for floating wind technology

Floating wind foundations are commonly used in deep waters (usually defined as those deeper than 60 m), where a fixed, permanent foundation is no longer economically and technically viable. The depth range of Wind Energy Innovation Area is between 34 m and 85 m with mean depth of nearly 69 m (**Table 3** below).

Table 3 – Depth range for Wind Energy Innovation Area

Mean depth [m]	Max depth [m]	Min depth [m]
-68.91	**-85**	**-34**

Source: Applicant on the basis of publicly available information

As a result, as presented in **Figure 3** the area has water depths suitable for both floating offshore wind (usually water depth >60m) as well as bottom fixed offshore wind (usually water depth <60m).

As one can infer from

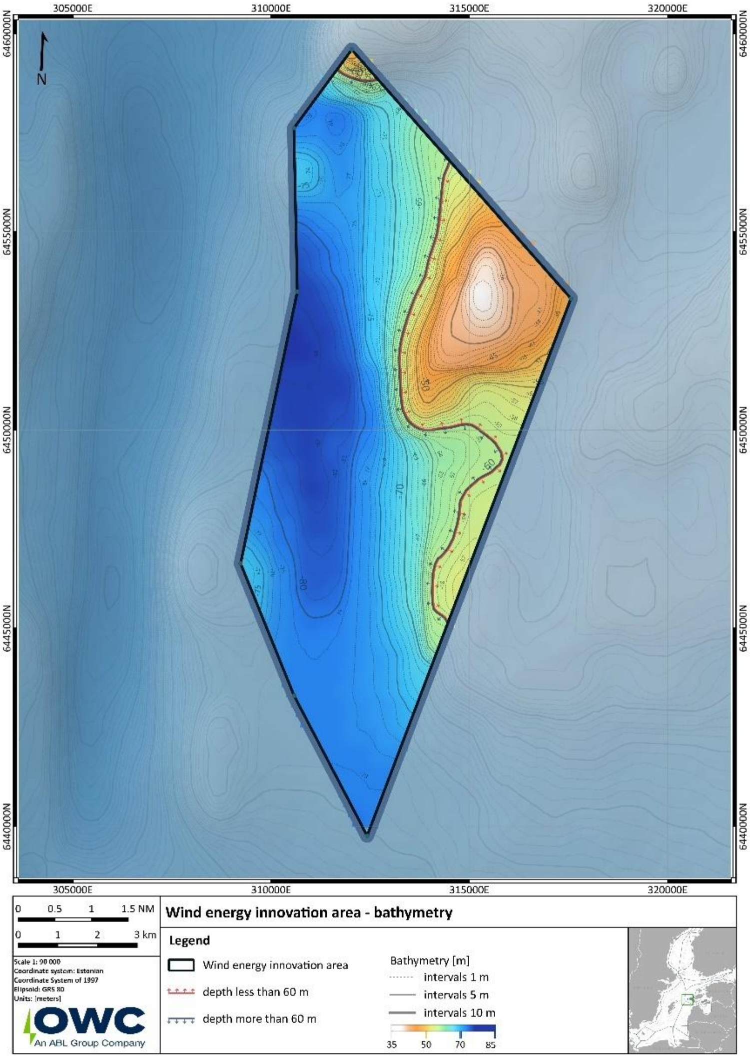
Table 4 below, approximately **75.22%** of the Wind Energy Innovation Area (**66.15 km^2**) has a depth greater 60 m and hence may be more suitable for floating foundations. The remaining area (approximately 24.78%) has the depth below 60 m and hence may be more suitable for fixed bottom installations.

Table 4 – Depth classes and their areas in the Wind Energy Innovation Area.

Depth Class	Area (km^2)	% of Total
85-86m	0.13	0.16
80-85m	15.59	17.73
75-80m	25.71	29.23
70-75m	10.32	11.73
65-70m	7.01	7.97
60-65m	7.39	8.4
55-60m	7.37	8.38
50-55m	3.16	3.59
45-50m	3.38	3.84
40-45m	5.18	5.89
35-40m	2.42	2.75
30-35m	0.29	0.33
Total	**87.95**	**100**

Source: Technical advisor of the Applicant on the basis of publicly available information

Figure 3 – Wind Energy Innovation Area - Bathymetry



Source: Technical advisor of Applicant on the basis of publicly available information

3.4. Potential capacity of the power plant

The Applicant strives to build the most viable Project from economic perspective, considering optimization of all Project parameters, including amongst others its layout (turbine number, position and spacing) and turbine size.

The Applicant proposes to build in the Saare 1 area a Project with a maximum total capacity of up to 900 MW, with up to 60 offshore wind turbines. The number of turbines, will depend on the selected turbine capacity, which, considering the current knowledge and technology development trajectory may range from approximately 15 MW to approximately 30 MW. Thus the maximum envisaged turbine capacity for the Project is 30 MW.

The system operator's (Elering) technical conditions for the connection of the power plant to the transmission network are attached to the Application as **Annex 4 – Technical conditions for the application for a building permit for the planned Saare 1 offshore wind farm of Oxan Energy.**

3.5. Number of construction works on the encumbered area and the ground projection area of the construction works

The number of construction works on the encumbered area and the ground projection area of the construction works for **Base case – A full scale offshore floating wind farm** (with fixed bottom option to ensure effective use of space) with capability of up to 900 MW have been presented in **Table 5** below.

Table 5 – The number of construction works and the ground projection area for Base case – A full scale offshore floating wind farm (with fixed bottom option to ensure effective use of space)

No.	Offshore Wind Farm Construction Work	Value / Description
1	**WTG – Wind Turbine Generators**	
1.1	Maximum number of offshore wind turbines	60
1.2	Ground project area of a single floating wind turbine (assuming a triangle shape floater, with maximum side length 110 m [m^2]	5 240
1.3	Ground project area of a single fixed bottom turbine (assuming a jacket foundation with no scour protection of square shape, with maximum side length 45 m [m^2]	2 025
1.4	Maximum ground project area (the case of all floating turbines) [m^2]	314 400
1.5	Mooring lines	The typical length of an anchor line for an 85 m water depth is ca. 600 – 700 m. The length and possible area of the anchor cables will depend on the site conditions and the location of the wind turbines, which is subject to further investigations during EIA.
2	**Offshore substation(s)**	
2.1	Maximum number of offshore substations	3
2.2	Ground project area of a single substation in case of 3 substation [m^2] (assumed 50 m x 60 m)	3 000
2.3	Ground project area of a single substation in case of 2 substation [m^2] (assumed 60 m x 70 m)	4 200
2.4	Ground project area of a single substation in case of 1 substation [m^2] (assumed 70 x 80 m)	5 600

Source: Applicant

The number of construction works on the encumbered area and the ground projection area of the construction works for an optional offshore station for hydrogen / alternative fuel production have been presented in **Table 6** below.

Table 6 – The number of construction works and the ground projection area an optional offshore station for hydrogen / alternative fuel production

No.	Construction object	Value / Description
1	Maximum number of production platforms	3
2	Ground project area of a single production platform [m^2] (assumed 150 m x 150 m)	22 500
3	Maximum ground projection area for 3 platforms	67 500

Source: Applicant

The number of construction works on the encumbered area and the ground projection area of the construction works for an optional innovative pilot aquaculture project with full scale commercial potential has been presented in **Table 7** below.

Table 7 – The number of construction works and the ground projection area for an optional innovative pilot aquaculture project.

No.	Construction object	Value / Description
1	Number of objects	6
2	Maximum total projection area per object [m^2]	54,000
3	Maximum total projection area for maximum number of objectives [m^2]	324,000

Source: Applicant

3.6. Maximum height and depth of the construction work

A range, presenting a maximum and a minimum height and depth of wind turbine sizes envisaged for the Base case of Project (from 15 MW to 30 MW) have been presented in the **Table 8** below. **The currently available 15 MW wind turbine has been presented as a reference as it has been used for layout and the business case purposes presented in this Application**.

The indicated technical parameters present approximate boundary of potential solutions, which may be employed, considering both future technological advancement as well as development and operational risks. The exact dimensions of the wind turbines and other objects will be specified at the design stage of the Project.

Table 8 – Wind turbines specification range for the Project.

Wind Turbine Capacity [MW]	Number of offshore wind turbines	Assumed rotor diameter [m]	Total maximum height above mean sea level [m]	Minimum distance between the blade of an offshore wind turbine at its lowest position and the average high sea level (the average sea level plus the average wave height of the corresponding sea area) [m]	Maximum depth of foundation in sea floor sediments [m]
15	60	250	285	25	80
20	45	275	310	25	80
30	30	330	365	25	80

Source: Applicant

The maximum height and depth of other construction works of the Base case of the Project have been presented in **Table 9** below.

Table 9 – Maximum height and depth and other technical parameters for other construction works of the Base case of the Project.

No.	Offshore Wind Farm Construction Work	Value / Description
1	**Offshore substation(s)**	
1.1	Maximum number of offshore substations	3
1.2	Maximum capacity of a substation [MW]	900

No.	Offshore Wind Farm Construction Work	Value / Description
1.3	Maximum height of offshore substation above mean sea level [m] (without a mast)	110
1.4	Foundation type	Bottom fixed
1.5	Maximum depth of foundation in sea floor sediments [m]	80
2	**Internal power grid (inter array cables)**	
1.1	Maximum burial depth (below seabed) [m]	3
3	**Power evacuation cables**	
3.1	Maximum number of power evacuation cables	3
3.2	Maximum burial depth (below seabed) [m]	3

Source: Applicant

The maximum height and depth of the construction work and other technical specifications of the Project related to an optional offshore station for hydrogen / alternative fuel production has been presented in **Table 10** below.

Table 10 – Maximum height and depth and other technical parameters for an optional offshore station for hydrogen / alternative fuel production

No.	Construction Work	Value / Description
1	**Optional offshore station for hydrogen / alternative fuel production**	
1.1	Maximum number of production platforms	3
1.2	Maximum height of alternative fuel production platform above mean sea level [m]	150
1.3	Foundation type	Bottom fixed
1.4	Maximum depth of soil penetration of the foundation [m]	80
2	**Optional internal hydrogen / alternative fuel network**	
2.1	Pipeline	Technology under development
3	**An optional hydrogen / alternative fuel transport pipeline**	
3.1	Maximum number of hydrogen / alternative fuel pipelines	1
3.2	Maximum burial depth (below seabed) [m]	3 (the pipeline will mostly be positioned on seabed, burial will take place only in sensitive areas

Source: Applicant

The maximum height and depth of the construction work and other technical specifications related to an optional innovative pilot aquaculture project with full scale commercial potential has been presented in **Table 11** below.

Table 11 – Technical parameters for an optional innovative pilot aquaculture project

No.	Construction Work	Value / Description
1	Maximum number of Seaweed lines proposed (pilot)	6
2	Maximum length of Seaweed structure [m]	120
3	Maximum length of Seaweed lines including moorings [m]	350

No.	Construction Work	Value / Description
4	Maximum width of Seaweed structure [m]	15
5	Maximum height of structure above sea level [m]	2.5
6	Foundation type	Fixed bottom or anchored
7	Maximum depth of soil penetration of the foundation [m]	10

Source: Applicant

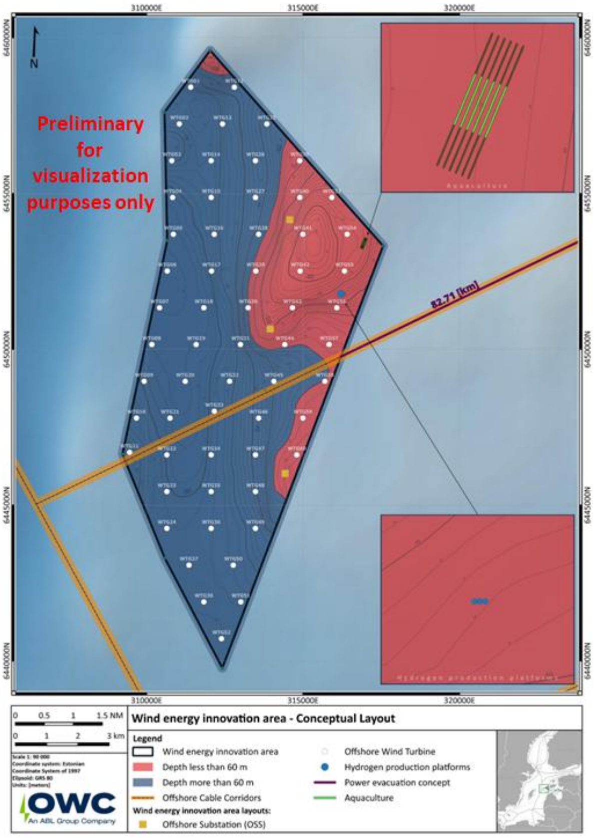
3.7. A map of the layout of the envisaged construction work and of any civil engineering works required for servicing the construction work

Maps of the layout of the envisaged construction work and of any civil engineering works required for servicing the construction work are presented in **Figure 4** and **Figure 5**, **which are for illustration purposes only**.

Figure 4 presents an illustrative Project layout in the Saare 1 area **considering the Base case** with 15 MW wind turbines and wind farm capacity of 900 MW. The figure presents:

i. 60 turbines;
ii. 3 offshore substation;
iii. 3 hydrogen production platforms (optional);
iv. Aquaculture pilot infrastructure.

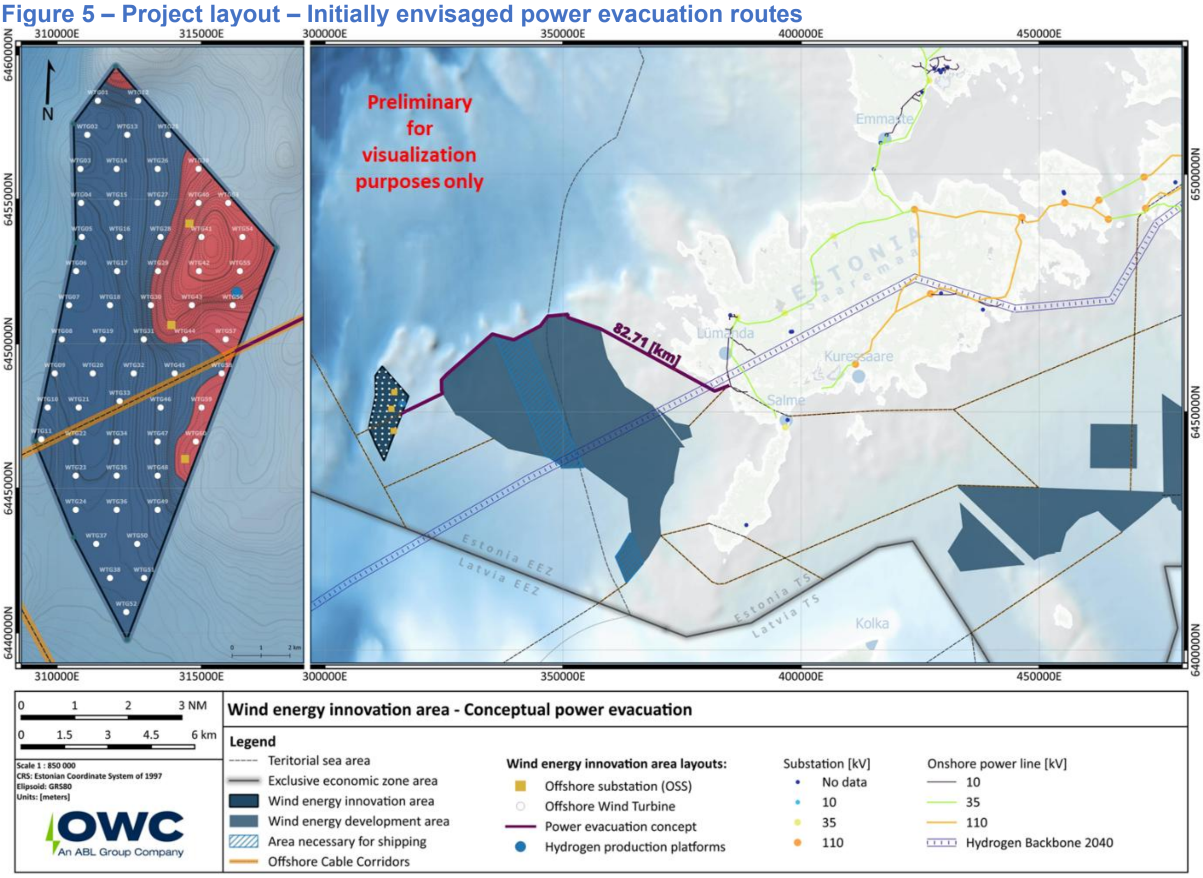
Figure 4 – Project layout – A map of the layout of the envisaged construction works and of any civil engineering works required for servicing the construction work for the Project



Source: Technical advisor of the Applicant on the basis of publicly available information

Figure 5 below presents illustrative options for power evacuation routes (as well as a hydrogen pipeline – optional), which converge to the same point on the Saaremaa Island and have been proposed in line with **the spatial layout 5.6.6.1 from the MSP**, which presents conceptual locations of electricity transmission systems from wind energy development areas and connection to the onshore energy network. The final power evacuation route will be selected based on survey data and grid connection conditions at the development stage of the project.

Figure 5 – Project layout – Initially envisaged power evacuation routes



Source: Technical advisor of the Applicant on the basis of publicly available information

4. Other technical particulars that are material to the Project

4.1. Considered foundation substructures

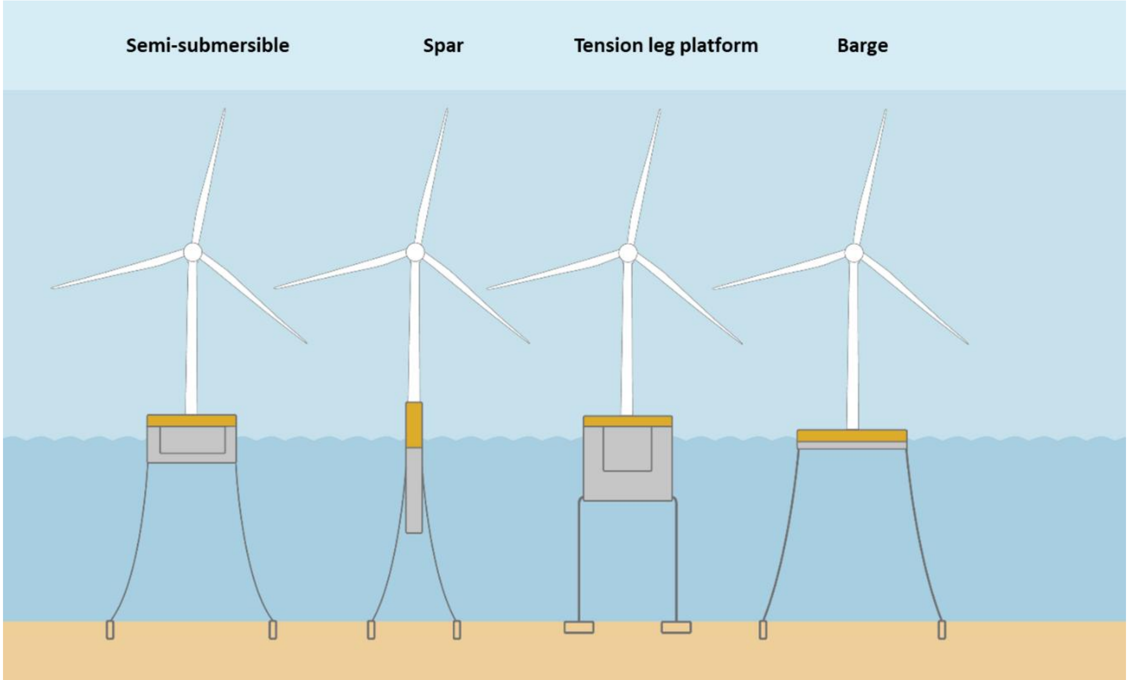
As indicated above and in line with the MSP's preferred solution for the Wind Energy Innovation Area, the Applicant considers firstly floating foundations, especially at the depths below 60 m. As per section 5.6.5 "Wind energy development guidelines and conditions" of the MSP "The environmental impact of floating foundations is equivalent to or smaller than that of the gravity-based foundation technology underlying this planning solution".

A floating foundation is essentially a platform on which a wind turbine attaches and which is attached to the seabed by anchors. In terms of floating foundations, tied to the seabed through anchoring systems, there are 4 basic structures, illustrated in **Figure 6** below, of which the following three are considered for the full scale commercial floating offshore wind farm[4]:

[4] The spar has been discounted because its dimensions require deeper water than is prevalent in the innovation zone.

1. **Barge** – the simplest class of structure with low construction complexity, however due to large waterplane areas and relatively small drafts, monohull structures are susceptible to large movements with onerous extreme weather conditions (though may work well in relatively mild conditions of the Baltic). There may be significant acceleration in sway for longitudinal structures and this may affect the type of wind turbine used and the design of cables and mooring system;
2. **Semi-submersible -** it achieves stability through wide distribution of buoyancy on the waterline. Major challenges include greater wave exposure and higher structure above the waterline. The diameter of the platform, to which the windmill attaches can be as much as ca. 150 m;
3. **Tension leg platform** - it achieves stability thanks to tension of the mooring line with the submerged buoyancy tank. The main challenges are instability during installation and high vertical loads on moorings and anchors.

Figure 6 – Floating foundations considered for a floating part of the full scale offshore wind farm



Source: Applicant on the basis of DNV-SE-0422 Certification of floating wind turbines

A specific type of floating foundation technology has not yet been selected. The final decision regarding the concept will be made considering results of studies at the time of FEED.

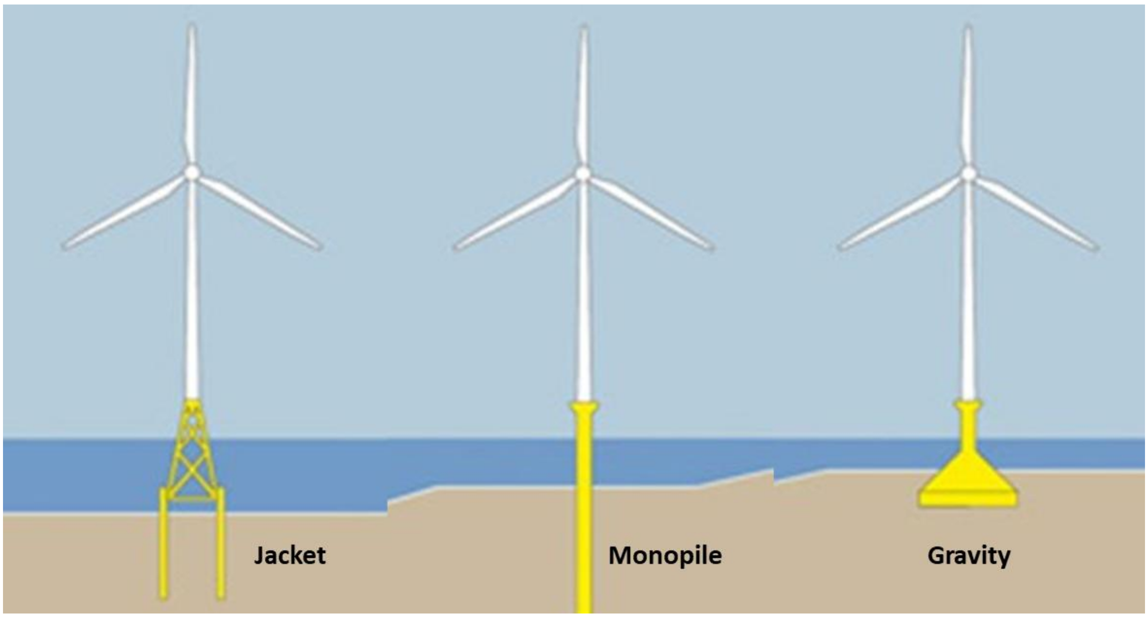
To ensure an effective use of space the Applicant may also decide to use fixed bottom foundations. At this stage the Applicant considers 3 types of fixed bottom foundations, which are presented below. As in case of the floating foundations the final decision regarding the concept will be made considering results of studies at the time of FEED.

a. **Monopile foundations –** consist of three basic parts: (1) a pile, (2) a tapered transition to a tower that supports a transition piece, and (3) a boat landing. By changing the transition piece, the foundation can be easily adapted to towers of different diameters. A monopile foundation can be driven into the bottom by piling or drilling, or a combination of the above techniques. The diameter and anchorage depth of the foundation are sized according to the load from the offshore wind turbine, geotechnical conditions, water depth as well as wind and met-ocean conditions. This type of foundations is typically used at depths of about 20 to about 50 meters. below this depth, the dimensions of the foundation increase to a size that causes, at present, technological difficulties in fabrication or cannot complete on costs with jacket foundations;

b. **Jacket foundations –** are used at greater depths than monopiles, and their structural efficiency may make them preferable for very large turbines and their associated loads. They consist of a jacket structure made of steel bars as the main load-bearing element. The structure is characterized by three or four legs. This structure is mounted to the ground with piles driven or drilled into the seabed. Due to the smaller cross-sections of the tubes, compared to other types of foundations, jacket foundations show greater resistance to wave action.

c. **Gravity based foundations –** are concrete structures that stand on the seabed and hold the wind turbine upright due to their size and weight. A gravity foundation is usually made of a concrete or steel shell that is filled with ballast (rock material or sand) weighing up to several thousand tons. The use of this type of foundation requires smooth ground and soils with good bearing capacity, with limited water depth (usually up to about 30-35 m). As the water depth increases, the size and weight of the structure increase significantly, especially for the increasing capacity of offshore wind turbines. In addition, the use of gravity foundations requires adequate ground preparation.

Figure 7 – Bottom fixed foundations considered for a floating part of the full scale offshore wind farm



Source: Applicant on the basis of DNVGL-SE-0190 Project certification of wind power plants

4.2. Hydrogen production and transport options

The Applicant, depending on market maturity and business considerations, does not exclude the possibility of hydrogen (or other alternative fuel) production in electrolysers mounted at the turbines or on a separate offshore hydrogen platform(s), located within the Project area. In this regard the Applicant will analyze a number of solutions, which may include, but are not limited to:

a. Transfer of hydrogen ashore in gaseous form via pipeline (to connect to e.g. European Hydrogen Backbone);

b. Transfer of hydrogen ashore in liquid form via dedicated LH2 units;

c. Other e-fuel option, which may become available during the course of Project development.

From a technological point of view, there are three basic types of electrolyser, differing primarily in the type of electrolyte, the use of which, in addition to other solutions, may be considered in the implementation of the Project:

a) **Alkaline electrolysers** - operate on the principle of transporting hydroxide ions (OH-) through an electrolyte from the cathode to the anode, where hydrogen is formed on the cathode side. The role of the electrolyte is played by a liquid alkaline solution of sodium or potassium hydroxide. This technology has been in use for many years, and can operate over a temperature range of 25ºC to 100ºC, at pressures of 1-30 bar and efficiencies of 50-80%;

b) **PEM** (Proton Exchange Membrane) electrolysers - in this case, the electrolyte is a special plastic - perfluorosulphonic acid polymer - PFSA. Water reacts at the anode, producing oxygen and positively charged hydrogen ions (protons). The electrons flow through the outer circuit and the hydrogen ions move through the PEM membrane to the cathode. At the cathode, these ions combine with the outer circuit electrons to form hydrogen gas. These devices can operate over a temperature range of 20ºC to 80 ºC at pressures of 1-80 bar and efficiencies of 60-80%;

c) **Solid oxide** electrolysers - use a solid ceramic material as an electrolyte that selectively conducts negatively charged oxygen ions at elevated temperatures, generating hydrogen in a slightly different way. Water on the cathode combines with the outer circuit electrons to form hydrogen gas and negatively charged oxygen ions. The oxygen ions pass through a solid ceramic membrane and react at the anode to form gaseous oxygen and electrons. This type of electrolyser must operate at sufficiently high temperatures to ensure that the membranes function properly (700-900ºC).

The production of hydrogen requires electricity and high-purity water. In view of the above and the possible applications of hydrogen, in addition to the electrolyser, the hydrogen production system will consist of the following components, among others:

a) A saltwater desalination and demineralisation system (heat generated from power generation equipment and heat generated from electrolysis can be used in this process);

b) Oxygen separation task;

c) Hydrogen purification unit

d) Compressor system - compression of hydrogen to achieve the appropriate pressure, depending on the purpose of the hydrogen use (e.g. storage, transfer to land, refuelling of vessels, etc.) and / or a system to produce liquid hydrogen for transfer to specialised transport units;

e) Hydrogen storage facility(ies), for example in the form of compressed gas at a pressure of e.g. 300 bar or 700 bar and/or a hydrogen liquefaction system and cryogenic tank(s).

f) Hydrogen transfer system, which may include one or more of the following options:

    i) A system for rigging ships with hydrogen;

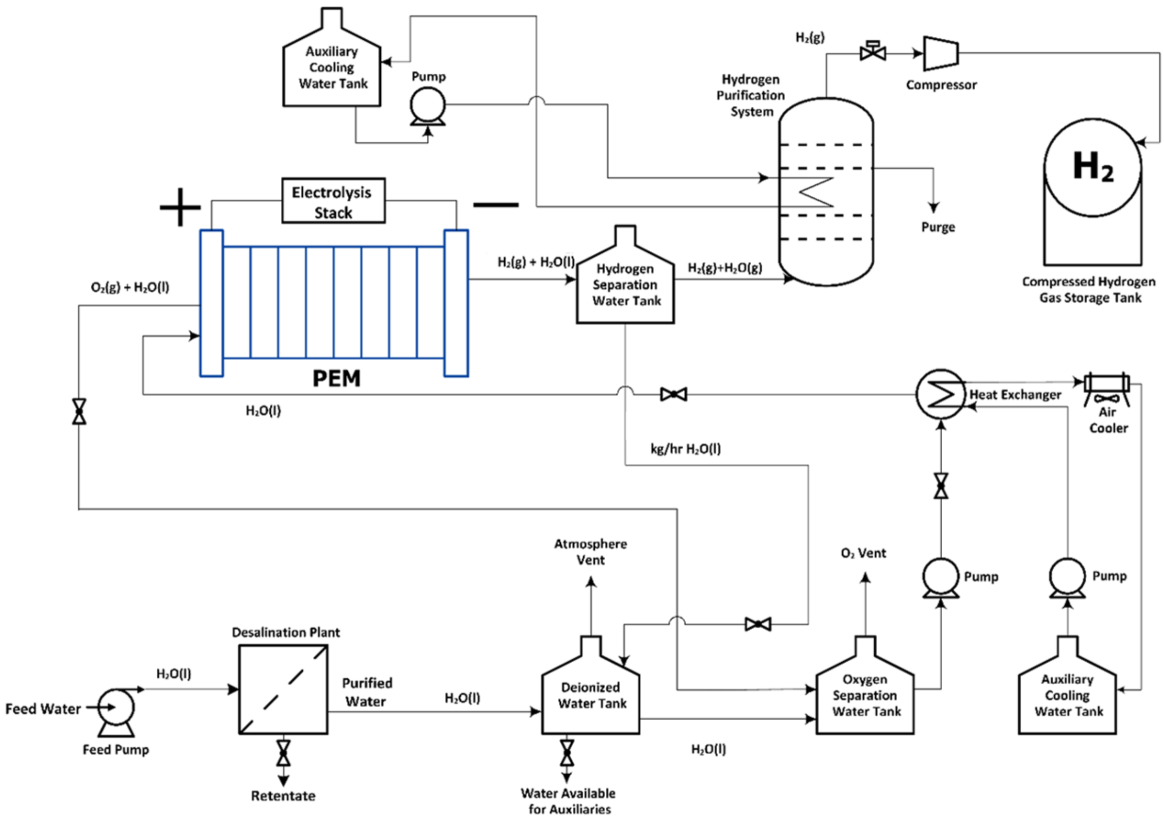
    ii) A system for transferring hydrogen gas into a transmission pipeline;

iii) Liquid hydrogen transfer system;

iv) The automation system responsible for 'energy balancing' and its use for hydrogen production.

Accordingly, as an option, the Project is considering placing the hydrogen production, storage and transfer system on an offshore hydrogen station. The preferred technology for this is currently PEM electrolysers (see figure below for an example schematic), due to their smaller footprint and easier maintenance, which in an offshore scenario means, reduced platform size and longer maintenance intervals.In line with the above, as part of the development process, the Applicant will carry out detailed analyses of the cost-effectiveness of energy transfer solution (power, hydrogen, other) to different markets in order to select the most cost-optimal option, taking into account, amongst others, demand in various countries and other conditions, technical limitations as well as transport options. The analysis will include an in-depth understanding of opportunities, which may present themselves in association with the development of European Hydrogen Backbone, and especially its Corridor D: Nordic and Baltic regions, which by 2040 is to have two planned lines[5].

Figure 8 – Example hydrogen system schematic



Source: Technical advisor of the Applicant

The second innovative hydrogen related technology under consideration will be storing and transporting of hydrogen after it has been liquefied by cooling to a very low temperature. The main advantage of the above technology is the significant reduction in the volume of stored and transported hydrogen, while the disadvantage is the need to use a large amount of energy

[5] ehb-report-220428-17h00-interactive-1.pdf

to cool it, which generates additional operating costs, especially compared to transporting hydrogen via a pipeline.

4.3. Optional aquaculture pilot

Considering the optional pilot aquaculture project, the Applicant will understand the possibility to deploy seaweed cultivation structures in the form of fixed bottom rigs or floating structures, with exact technology to be understood at the time of Project development.

For illustration purposes, the Applicant envisages for example a fixed bottom structure with up to 6 x 100-120-meter nets in depths of say 35-45 meters to fully gauge and evaluate the seaweed potential of the site. Each seaweed line would occupy a length of 330-350 meters and width of 10-15 meters, with maximum height of the structure (poles) of 2.5 meters above sea level.

As the research on the subject is still very much ongoing, the Applicant does not exclude a possibility using any other viable aquaculture approach to best prove economic viability of aquaculture. This may include using for example some sort of floating structure or other leading solution at the time of Project development, or partnering with a known seaweed developer to benefit from already conducted research and proven methods.

5. Project timeline

5.1. Applied-for duration of the license

Pursuant to § 113^{14} (1) of the Building Code the Applicant applies for a building permit for the period of 50 years. The Applicant does not exclude the possibility of extending the superficies license by up to 50 years pursuant to § 113^{14} (2) of the Building Code.

5.2. Project stages and key assumptions

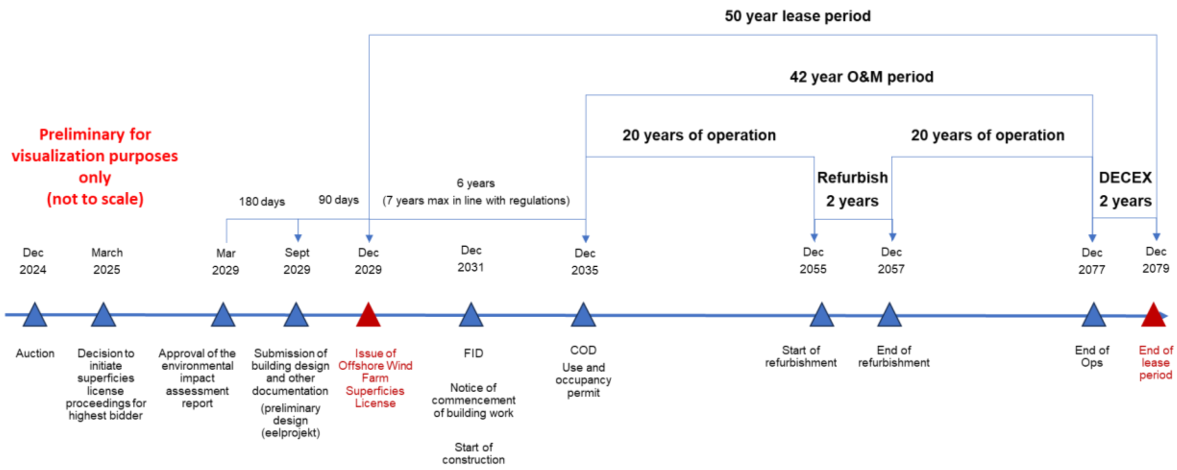
The Applicant expects that the Project, in line with its concept, will be executed in the stages presented below and in **Figure 9** below:

1. **Stage 1** (**Base case**) – From schedule perspective, this stage will be further divided into:
   a. Development with the objective to: (i) perform EIA and other development and design activities to obtain superficies license, (ii) select the most advantageous technical and route to market solution for the COD date, (iii) plan and execute purchases of wind farm packages, (iv) identify and ensure timely readiness of suitable fabrication and assembly facilities;
   b. Construction with the objective to: (i) fabricate and install all wind farm elements in line with the established route to market;
   c. O&M – operation and maintenance of Project with potential for repowering / refurbishment of the equipment, in line with prevailing technical solutions and market conditions;
   d. Decommissioning – with the objective to: (i) decommission and recycle components in line with the environmental considerations and technology available at the time of decommissioning.
2. **Stage 2** – If a positive decision is made for the optional hydrogen production and / or an innovative pilot aquaculture project, it will be built in parallel or upon completion of Stage 1. This stage is not shown in **Figure 9** below.

Assuming that the offshore superficies license will be awarded to the Applicant after approval of Environmental Impact Assessment Report and submission of building design and other documentation in line with the Building Code in December 2029 for a period of 50 years, it will expire in December of 2079. This implies that the Project could be in operation for ca. 42 years, when also considering a 2 year repowering / refurbishment and 2 year decommissioning periods (please see Figure 9 for details). As a result, as an initial consideration, the operation time of the Project has been divided into two equal 20 year periods, with 2 year refurbishment window in between. The decision regarding the above arrangements will depend amongst others on prevailing market conditions and their forecast at the time of making investment decisions, wind farm technical and legal considerations, and available technology at the time of decision making. As a result, the Applicant remains open to technical solutions for life extension / repowering / refurbishment available in ca 30 years time.

A graphical visualization of the overall project schedule has been presented in the figure below.

Figure 9 – Visualization of a preliminary Project schedule



Source: Applicant

6. Consistency of the project with MSP and Estonian legal acts and strategic documents

6.1. Consistency of the Project with MSP

6.1.1. Consistency of the Project with objectives of the MSP

The Estonian government adopted MSP on 12 May, 2022. MSP is a strategic spatial development document on the national level, which plans the basic developments in marine space.

The Project is fully consistent with objectives and relevant guidelines presented in the MSP related to renewable energy production[6] and long-term vision of the Estonian marine area. In addition, throughout the lifetime of the Project, the Applicant will promote good environmental status, diverse and balanced use, and the sustainable growth of blue economy

[6] As presented in Chapter 5.6 Renewable energy production of the MSP

as presented in Chapter 3 – "Marine area trends, vision and principles for spatial development" of the MSP.

6.1.2. Compliance of the Project with environmental and social conditions set in the MSP

The Project is designed to fully observe the identified constraints, including those of social, environmental and technical character. From social and environmental perspective, the Saare 1 area has already been placed far away from the coast[7] with no overlap with water traffic areas and areas of high importance for bird migration[8].

The Saare 1 area does not overlap with existing and planned protected areas and has been designated far away from movement areas of the Baltic ringed seal. In addition, there are also no significant socio-economic adverse effects on coastal and recreational fishing: wind turbines are planned to be much more than 6 nautical miles from the coast, thus preserving fisheries.

All these elements will be taken into account during the EIA process. The Applicant, however, does not foresee that they will have any significant impact.

Considering the above, the Saare 1 area has been positioned for an offshore wind energy project to meet social and environmental conditions set in the MSP. **Chapter 7 Environmental impact** and **Chapter 8 Social aspects of the Project** of this Applications presents a closer review of potential considerations in this respect with a conclusion that a proper project development should allow implementation of an offshore wind farm with no or minimal negative environmental and social impacts.

6.1.3. Compliance of the Project with other guidelines and conditions set out in the MSP

Project concept as well as its future development and design will be compliant with all applicable guidelines and all applicable conditions detailed in the MSP, including, but not limited to Section 5.6.2 "Starting points for wind energy development", Section 5.6.5 "Wind energy development guidelines and conditions" as well as Section 5.6.6 "Cable corridors from wind energy development areas to land".

As the guidelines and conditions have been considered in various, relevant parts of this Application, the following present only selected examples of compliance:

a. **Turbine size and site layout** – the turbine dimensions as well as wind farm layout will consider technical indicators presented in Section 5.6.2 of the MSP, however, taking into account technical advancement in the area of Wind Turbine Generator ("WTG"), results of wake effect simulations and environmental constraints. As a result, if not prohibited by environmental or other constraints the Applicant will use the latest technology available at the time of Project design to ensure its optimum economic outcome;

[7] The Saare 1 area is located ca. 60 km west of the coast of Saaremaa, behind other wind farm areas being closer to the coast

[8] An analysis of bird staging areas and migration routes was carried out during the maritime spatial planning process, the results of which indicate that the planned wind energy development areas 1 and 2, as well as the innovation area, are located outside the sensitive marine areas for birds.

b. **Positive synergy and effective use of space** – to ensure the most effective use of space, the Project also considers an option of aquaculture. The potential development of aquaculture, which currently considers seaweed, in the future may also take into account (depending on actual conditions) the innovative sectors of algae and shellfish farming, the development of which will be executed according to the guidelines presented in the MSP EIA Report. In addition, the Project may benefit from current and future R&D efforts and deploy other hybrid solutions;

c. **Buffer zone between two different offshore wind farms** – in the case of Wind Energy Innovation Area, which does not border with any other wind energy areas, the buffer zone is not applicable. As a result no buffer zone has currently been considered;

d. Conceptual locations of electricity transmission systems – the presented concept of the Project takes into account the conceptual locations of electricity transmission systems from Saare 1 area and connections to the onshore energy network as presented in the spatial layout 5.6.6.1 of the MSP and indicated in **Figure 4** and **Figure 5** above. Further to considerations of cable corridors presented in the MSP, which does not provide full routing guidelines from the Saare 1 area to a connection point onshore, a power evacuation alternative routes have been proposed in line with point 5.6.6. “Cable corridors from wind energy development areas” of the MSP (see **Figure 5** for details). The routes should not have a significant adverse impact on wildlife and adverse impacts on Natura 2000 sites, which will be investigated in detail as part of EIA during Project development stage.

6.2. Compatibility of the Project with main legal acts and strategic documents

The Project is in line with both international and national laws. The Saare 1 area is located within the Estonian EEZ. Construction in the Estonian EEZ is regulated by the Exclusive Economic Zone Act (RT I, 19.03.2019, 101). Estonia has the right to explore, exploit, manage living and non-living natural resources located in the water covering the seabed, on the seabed and in the land below it in the EEZ, and to carry out other activities in the exploration and use of the EEZ. Estonia has the exclusive right for all economic activities in the zone.

The regime of coastal areas is most directly affected by the Convention on the Protection of the Marine Environment of the Baltic Sea Region (RT II 1995, 11, 57), which obliges the parties to the convention to ensure the protection of nature and biological diversity. The parties to the Convention apply all necessary measures to the Baltic Sea and the coastal ecosystems affected by it, both individually and jointly, in order to preserve the habitats and biological diversity of plant and animal communities and to protect ecological processes. The Convention is implemented by the Commission (HELCOM) formed on its basis, which has issued several recommendations for the protection of coastal and marine areas. The Project takes them into account (see **Chapter 7 Environmental impact**).

The Marine Strategy Framework Directive 2008/56/EC provides the framework within which the Member States shall take the necessary measures to achieve or maintain good environmental status in their marine waters by 2020 at the latest. The Directive does not limit the development of wind turbine areas. The aim is to contribute to the coherence of the various policies, agreements, and legislative measures affecting the marine environment and aims at ensuring the integration of environmental concerns into such policies, agreements, and measures.

The following presents compatibility of the Project with the legal acts and strategic documents below:

1. Long-term development strategy of the Estonian state "Estonia 2035";
2. National Spatial Plan „Estonia 2030+;
3. The Climate Policy Principles until 2050;
4. The Development plan for adaptation to climate change until 2030;
5. Estonian National Energy and Climate Plan 2030;
6. Estonian Energy Development Plan until 2030 (ENMAK);
7. European Union Strategy for the Baltic Sea Region;
8. Estonian Marine Strategy;
9. RDI Strategy and Entrepreneurship Strategy;
10. National Strategy on Sustainable Development "Sustainable Estonia 21";
11. The Environmental Strategy 2030.

Long-term development strategy of the Estonian state "Estonia 2035" - Based on the analysis of the situation in Estonia and developments in the world, there is a need for important steps to be taken in almost all areas of life to improve the current situation or to take advantage of available opportunities. The goal in the economy and climate area is to introduce new solutions to encourage research and development and innovation in business sector being open and support new solutions, such as offshore wind energy. **The Project directly helps to implement the plan by promoting offshore wind energy and associated innovative solutions, such as hydrogen production and aquaculture, for the use of renewable resources.**

National Spatial Plan „Estonia 2030+ – National planning provides a general basis in the form of spatial trends. National planning emphasizes the efficient and sustainable use of the marine area and Estonia's openness to the sea and sets out general directions for achieving this as a principal theme development. In the field of energy production, national planning foresees strong development in wind energy, including the offshore area. This is also important for increasing energy security. Most suitable areas for the development of wind farms are located in maritime area of West Estonia. In order to increase the security of supply on the islands and the introduction of local renewable energy sources, the aim has been to establish a high-voltage loop connecting West-Estonian islands and the mainland, which will allow better connection of offshore wind farms to the grid. Taken the previous into consideration, **the Project responds to the National spatial plan Estonia 2030+**.

The Climate Policy Principles until 2050 – According to the vision of climate policy, by 2050, Estonia will be a competitive, low-carbon emission economy. The country's readiness and capacity to minimize the negative impacts of climate change and to make the most of the positive impacts are assured. Estonia's long-term target is to reduce its greenhouse gas emissions by almost 80 percent by 2050 compared to 1990 levels. Moving towards this target Estonia will reduce greenhouse gas emissions by approximately 70 percent by 2030 and 72 percent by 2040 compared to 1990 levels. **The Project directly helps to implement the policy.**

The Development plan for adaptation to climate change until 2030 – The main objective of the development plan is to increase the preparedness and capacity of the national, regional, and local levels to adapt to the impacts of climate change. Estonia is moving towards achieving a climate-neutral economic model by applying, among other things, the latest scientific development and innovation achievements. It has also been considered one of the main goals of the energy and climate plan. In addition, the use of research and development and innovation in measures to maintain the competitiveness of the economy has been identified as one of the main goals, adding that the implementation of the energy economy research and development program enables the implementation of measures using research and innovation achievements. **The Project directly helps to implement the plan**.

Estonian National Energy and Climate Plan 2030 (NECP) –The main targets being reduction of Estonian greenhouse gas emissions by 80% by 2050, securing the 42% share of renewable energy in the total final energy consumption by 2030 and ensuring energy security. As the main objective of the Project is developing renewable energy source – offshore wind farm, it contributes to the aforementioned targets. **Thus the Project directly helps to implement the plan**.

Estonian Energy Development Plan until 2030 (ENMAK) – The main objective is to ensure the availability of energy supplies to consumers at an acceptable price. The plan set a target that electricity generation from renewable energy sources should account for 50% of final domestic electricity consumption and 80% of the heat produced in Estonia shall be based on renewable energy sources. **The Project directly helps to implement the plan**.

European Union Strategy for the Baltic Sea Region (EUSBSR) – The strategy unites eight EU Member States around the Baltic Sea – Estonia, Lithuania, Latvia, Poland, Sweden, Germany, Finland, and Denmark. The strategy includes saving the sea, connecting the region and increasing well-being and a wide range of policy and cross-cutting issues stemming from different objectives including climate change and spatial planning. Still it emphasizes the good environmental status of the sea and the importance of the conservation of fish stocks. The plan designates waterways and reflects fairways. Erection of potentially obstructing structures (e.g., wind turbines) on fairways under the conditions of the plan is excluded. Important areas affecting maritime safety (e.g., wind energy, aquaculture) are subject to conditions to specify the synergy during the licensing process. **The Project is not in conflict with the strategy**.

Estonian Marine Strategy – The main objective of the Directive 2008/56/EC is to maintain or achieve, by 2020, at the latest, good environmental status in its marine environment, which can be achieved through taking national measures. Each country needs to develop and implement a Marine Strategy for its maritime domain to promote the sustainable use of the seas and preserve marine ecosystems. Based on the directive the renewal of the state action plan for the marine areas is currently in proceeding. According to the draft plan measures are also planned to establish underwater noise regulation and to establishment of a network of marine protected areas in the Estonian EEZ. **The Project is not in conflict with the strategy.**

RDI Strategy and Entrepreneurship Strategy – From the policy fulfillment perspective, the RDI Strategy and Entrepreneurship Strategy compiled by the Ministry of Education and Research and Ministry of Economic Affairs and Communications lists Estonia's development on knowledge-based and innovative solutions as one of its goals. In order to reach that, the state must develop activities that encourage innovation and create a support system for enterprises. As a part of the strategy, the Estonian state specifically mentions that energy efficiency measures and renewable energy should be promoted in Estonia as a means of promoting innovation capacity. **The Project directly helps to implement the strategies.**

National Strategy on Sustainable Development "Sustainable Estonia 21" - The aim of the strategy is to combine the requirements for success arising from global competition with the preservation of the sustainable development principles and Estonia's traditional values. The strategy is implemented through various sectorial strategies and development plans to contribute the sustainable development of Estonia. Objectives of Estonia's sustainable development are the viability of the Estonian cultural space, the growth of welfare, a socially coherent society and ecological balance which can be associated with the benefits of using more renewable energy. **The Project directly helps to implement the strategy.**

The Environmental Strategy 2030 – The Environmental Strategy 2030 aims at defining long-term development trends for maintaining a good status of the natural environment, while keeping in mind the links between the sphere of the environment and economic and social spheres and their impact on the natural environment and people. The areas of the strategy are "The environment, health and quality of life", "Sustainable use of natural resources and reduction of waste generation", "Climate change mitigation and quality of ambient air" and "Environmental management". **The Project is not in conflict with the strategy, helps to use the natural resources sustainably and combat climate change.**

7. Environmental impact

7.1. Introduction

The intention of the Applicant is to develop the Project following the applicable Estonian (and international) regulations and the good practices and experiences taken from the other markets. As part of superficies license proceedings an EIA will be carried out, in order to identify and evaluate potential impacts, while also recommend the appropriate measures to limit the impacts whenever required. This process will be preceded by the environmental surveys and monitoring program allowing recognition of the environmental conditions in the Saare 1 area and its surroundings. **All this, together with the proper development of the Project, should allow implementation of an offshore wind farm having no or minimal negative environmental impacts.**

It should be noted that since SEA was carried out during the preparation of the MSP and before designating the Saare 1 area explicitly for the renewable energy purposes, one may assume that implementation of the proposed Project is aligned with earlier studies and generally feasible.

Given the early stage of the development, the topic of environmental impact could only be addressed at a general level, so the key environmental considerations are described below for reference.

This section provides a brief overview of potential environmental impacts of the Project during the various stages of its life-cycle. Appropriate mitigation measures will be developed and implemented to eliminate these impacts or minimize them to an acceptable level.

7.2. Construction phase

Construction phase is the shortest but likely most intensive period of the project's life cycle. Activities carried out at this stage may cause disturbance to the seabed because of survey and preparatory works and construction, removal of boulders if necessary and stones as well as layers of bottom sediments during clearing of the site, while the seabed fragments will be seized by the foundations. Water quality could be affected by the movement of the sea bottom sediments or an increase in water turbidity. Depending on the applicable regulations, area could partially or completely be closed for fisheries or obstructed by the construction works. Accidental emission of petroleum substances is possible in the emergency situations. Air may be affected by the emissions from the combustion engines (if such engines are still in usage at the point of construction), in conjunction with an increased movement of the vessels. This might also lead to increase emissions of noise that might affects sea mammals if not mitigated accordingly (i.e. by using bubble curtains during the especially noisy pilling works). Due to position of the Saare 1 area, the Project will not affect the landscape overview seen from land, but such an obstruction may be important in terms of the bird migration, what should be assessed accordingly during the pre-construction birds monitoring.

It should be noted that environmental impacts during construction phase will be temporary in nature and mostly reversible, and their short-term character will support implementation of appropriate mitigation measures.

In general, the environmental impacts at the construction stage will be temporary and transient in nature, and will mainly concern the part of the construction stage that is related to foundation and cable connections. It should be emphasized that for almost the entire area of the planned Project (except for the area of foundations, erosion protection and locations of cable protection systems), the anticipated destruction of the seabed and its habitat, and other related effects, will be very short and will have reversible impacts. After the construction phase, the transformed strip of bottom habitats will be subject to natural recolonization processes, and the pre-Project conditions will be restored.

7.3. Operation phase

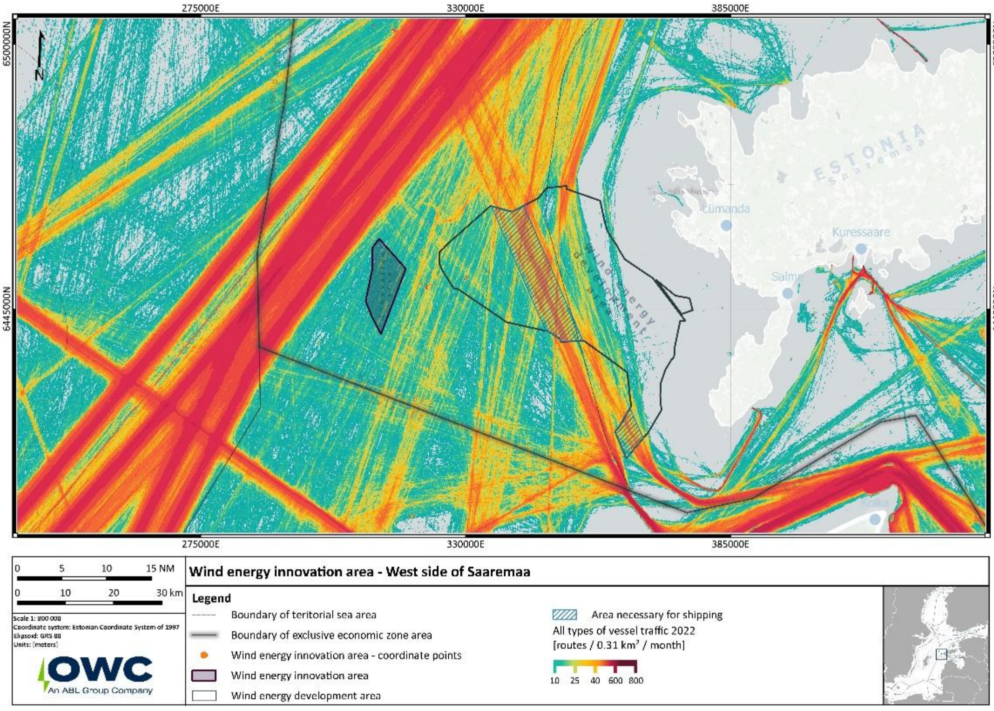
During the operational stage the main impacts will come from the movement of the maintenance vessels and carrying out service works. This might result in emissions of pollutants from fuel combustion.

Depending on the applicable regulations and further arrangements, area could by partially or completely closed for fisheries, which might result in increased fishing activities in the surrounding areas, while the occurrence of various fish species might be also affected by the constructed infrastructure. Accidental emission of petroleum substances is possible in the emergency situations. Landscape might be affected by the movement of the services vessels and by the turbines itself, which will be visible from nearby shipping routes (

Figure 11**)**.

Operating wind farm should not significantly affect the sea mammals. Structures might however affect birds' movement, thus actual impact should also be monitored, in order to validate the pre-construction assessment of the impacts on birds.

Figure 10 – Saare 1 area in the context of vessel movement intensity (shipping routes, fishing, etc.)



Source: Applicant on the basis of publicly available information

7.4. Decommissioning phase

During the decommissioning phase, which may require the removal of the infrastructure and restoration to the area to the pre-development stage, impact similar to the construction stage may occur. This means impact on the sea bottom and its sediments, emission of noise, temporary emission of pollutants to air from the vessels and machinery used and increased vessel movement.

7.5. List of envisaged investigations that the Applicant intends to undertake in order for a decision to be made concerning the application

According to §6 (1) 5) of the Environmental Impact Assessment and Environmental Management System Act, the erection of a wind power plant in a water body is an activity with an environmental impact which requires carrying out an EIA. During the EIA, the direct and indirect main environmental impacts of the planned activities and their realistic alternatives will be identified, and appropriate environmental measures will be developed that can prevent or reduce adverse environmental impacts. The EIA shall assess all major impacts, including those on protected natural objects, birds, etc., and also the cumulative impacts of the activities (including neighboring areas prescribed for the development of offshore wind farms in the Estonian Maritime Spatial Plan).

The EIA proceedings will be carried out in line with § 3^2 of the above act, which visually has been depicted in

Figure 11 below. All necessary impact assessment areas will be reflected in the EIA program and will be carried out according to § 13 of the above act.

Figure 11 – Illustration of EIA Proceeding in line with § 3[2] of the Environmental Impact Assessment and Environmental Management System Act

Source: Applicant on the basis of publicly available information

An initial analysis of the available literature data showed that the environment of the proposed area is explored in rather limited way. Therefore, it is planned to perform detailed and comprehensive inventory studies before starting the construction phase of the Project. Their purpose will be to characterize the biotic and abiotic conditions of the environment, with the obtained results used for the preparation of the EIA report. Areas and species having a value from the nature perspective will be indicated, which will be taken into account with particular care in the consideration of minimizing the negative impact of the planned investment on the environment.

According to the MSP, when deciding on the locations and technological solution of wind turbines at the level of the permitting procedure/EIA level, the EIA will assess the potential impacts of the future offshore wind farm based on literature, available data and site surveys.

Key elements of the future surveys will be:

a. Bathymetry;

b. Meteorological studies of the marine area, including monitoring of wind, wave, current and ice conditions;

c. Various elements of the abiotic environment:

   i. Sea bottom sediments and geophysics of the bottom;

   ii. Hydrological and hydro chemical conditions;

   iii. Verification of the mineral resources deposits;

As part of these studies it will necessary to determine the chemical (hazardous substances, nutrients) and physical properties of the sediments. The studies will include modelling of the formation and spreading of chelated sediment in order to assess the impact of the wind farm on fish spawning grounds, spawning and migration, and a study of seawater quality.

d. Various elements of the biotic environment:

   i. Ichthyofauna (fish);

   ii. Avifauna (birds);

   iii. Sea mammals;

   iv. Chiropter fauna (bats);

   v. Zoobenthos (plankton like organisms);

   vi. Flora upon certain extent;

The surveys of benthic fauna (plankton like organisms) will also provide an overview of seabed habitat types, while surveys of fish will include spawning areas and fish migration.

e. Underwater archaeological investigations, including investigation of the presence of wrecks, historical explosives and other dangerous objects in the investigated / construction area;

f. Noise studies (during construction, operation and dismantling, with a particular focus on underwater noise and vibration);

g. Impact of the released heat energy and possible vibrations related to the magnetic field and facilities assessment;

h. Socio-economic analyses;

i. Visual impact assessment;

j. Impact to the maritime traffic assessment.

In addition to the offshore wind farm, this Application also includes a possibility (options) of hydrogen production and aquaculture. In case any of these options are selected, the Applicant understands that an EIA may also be needed to analyse their impact. The Applicant notes that if hydrogen production also involves water abstraction and discharge of used water back into the sea, depending on the exact scale of the activity, an EIA may also be required for this activity without justification (KeHJS § 6(1)(19) and § 11(3)).

It should be noted that modelling of the formation and spreading of silt, studies of the sea-bed sediments, seabed biota and habitat types (as well as fisheries) will also be planned for the export cable routes, which would allow the selection and assessment of the most optimal routes for the marine environment. If an option of a pipeline for hydrogen/alternative fuels is selected, studies will also be carried out in the area where the pipeline will be located.

The Applicant will perform all needed studies, which will be reflected in the future EIA program. At this point the Applicant does not see significant environmental constraints, which could affect the Project.

8. Social aspects of the Project

8.1. Introduction

Social aspects are of important nature during the development of every offshore wind project. They concern issues related very closely to the particular project, but also have much broader meaning in the context of the overall sector at large.

The following sections discuss the impact of investments on society, both in general terms and in the context of the identified issues that were considered significant.

8.2. Energy security

The Project with its innovative solutions related to fixed bottom offshore wind fulfills the most important social function – it will allow for an increase in the share of renewable energy in the energy mix, which will allow Estonia to improve its "energy trilemma" score[9], which assesses countries along three dimensions: (1) energy security, (2) energy equity and (3) environmental sustainability.

According to the data presented by the World Energy Council for 2022, the Estonian trilemma score was ABA[10], which allowed the country to be ranked in a very high 9th position (out of 91 listed regions), with a significant improvement in the recent period. It should be noted however,

[9] WEC Trilemma: Country profile (worldenergy.org)
[10] A score for Energy Security, B score for Energy Equity and A score for Environmental Sustainability

that the components of the indicators of "energy security" are generally growing but “import independence” factor is decreasing. Concerning "energy equity" most of the factors remained unchanged in the last few years, but the factor “electricity prices” is one of the concerns in the current conditions. Ultimately, the "environmental sustainability" has slowly increased in the last years, but one of its components, “the low carbon electricity generation factor” may require enhancement.

A large-scale offshore wind installation, such as e.g. the Project, characterized by relatively high efficiency, likely higher than that of other renewable sources in Estonia, will provide enhancement to the aforementioned factors, ensuring Estonian energy security and its significant energy export potential.

8.3. Social acceptance

Social perception of offshore wind energy can be considered on two levels. On one hand, it is the technology of energy production very positively perceived by the society. On the other hand, societies simultaneously perceive offshore wind energy as a promising solution in the context of changes in the country's energy system to fight climate change, confirmed by research and analysis. Thus, one may infer that offshore energy sector in general and the Project in particular, fit well with social expectations related to the inevitable transformation of the energy system.

It should be noted however that social acceptance is not given once and for all, and that it is also an issue that is important also at the level of specific projects, not just the entire industry. As part of shaping the relationship between the offshore energy sector and the society, the Applicant intends to act in two ways: firstly joining national campaigns of industry associations (if such will be in place at the time of project development), and secondly conduct own information campaigns and communicate directly with local communities. As indicated by the analysis carried out for the needs of the currently implemented offshore wind farms, the empowerment of local communities is also a necessary condition to avoid social conflicts, which is discussed later.

8.4. Engagement with local communities

Taking into account the industry experience to date, local communities - understood both as local governments, but also residents of particular regions, are recognized by offshore wind investors as important stakeholders in the discussion about offshore wind energy in general, and specific projects in particular. Considering the Project, the key stakeholders will be the communities of the Saaremaa island, and especially its west coast, but likely also the other regions. Community involvement, be it in the form of consultations or parties in proceedings regarding environmental decisions or building permits, is considered a necessary minimum. As a result, the Applicant intends to follow best practices regarding cooperation with local communities.

Referring to the results of research concerning the activities expected by local governments related to the potential construction of offshore wind farms, the Applicant will take actions considering expectations and needs of local communities, especially those related to the Project. This will include provision of information regarding the investment itself and its impact on people and the environment (distribution of materials, website, information point during the implementation of the investment, organization of a study visit to an operating wind farm and exchange of experiences with communities where such projects already operate, educational activities at different levels). All of these topics will be covered in a stakeholder management plan and associated communication plan, both of which are standard studies in the development of offshore wind energy projects.

The impact of the Project on local communities will also have an economic character. The intention of the Applicant is to base the Project on the Estonian supply chain whenever possible, at the development, construction and operation stage. This means encouraging and supporting the development of the production industry, usually located in coastal areas, as well as the location of the service base within the existing port infrastructure. Especially the latter point seems to be important from the point of view of local communities, as it will enable the development of new activities in the region (for example, the stationing of a fleet of ships for the transfer of crews or the construction and operation of the OWF service and operational base). All these activities involve an economic impulse, tax revenues and the creation of employment opportunities, which from a social point of view is clearly positive.

8.5. Summary of the social aspects

Various interactions between the Project and various social issues have been considered. Some of these were described above, although there is a number of others to be addressed at a later stage. The Applicant remains open, should there be a need to clarify or extend individual elements.

Offshore wind energy can have a variety of social impacts, both positive and negative. Analyzing all these issues, it can be concluded, that from a social point of view, the development of offshore wind energy has a positive connotation in a broad sense, as it may contribute to the management of a number of current world's issues. Such issues of key importance include the fight against climate change, energy transformation and increasing energy security. Local communities can also benefit to some extent from investment, and the economic impulse and development of the local supply chain, whether in terms of production or service, is an undeniably positive element that can benefit society as a whole, with particular emphasis on coastal areas. Adverse effects, as well as possible social conflicts, seem to be well recognized now, and there are already ways to deal with them, largely based on experiences from other markets and related industries.

In summary, **the proposed Project will be a socially beneficial undertaking, and any possible negative effects can be minimized to an acceptable level**.

9. Sources of funding

The information regarding the particulars concerning the sources of funding intended to finance the Project has been presented in Annex **1** – Commercial Register

1. **Annex 2** – Register of Beneficial Owners

Annex 3 – Confidential informationAnnex 3 – Confidential information**.**

Relevant financial statements of the Applicant has been appended to the Application as **Annex 5 – Applicant financial** statements.

10. Appendices

The following documents are attached to this Application:

2. **Annex 1** – Commercial Register
3. **Annex 2** – Register of Beneficial Owners
4. **Annex 3** – Confidential information
5. **Annex 4** – Technical conditions for the application for a building permit for the planned Saare 1 offshore wind farm of Oxan Energy
6. **Annex 5** – Applicant financial statements